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ABSTRACT

The purpose of this study was to determine how 16 Navy (self-paced) and 18 Marine Corps (group-paced) Aviation Storekeeper Schools students would perform on the same test, assessing mastery of an identical topic related to the selected variables of learning styles and Armed Service Vocational Aptitude Battery (ASVAB) test scores. No significant difference was found between the self-paced or group-paced instruction. Pretest scores indicated that students knew very little information regarding the learning tasks prior to instruction. Those who scored higher on the ASVAB test preferred learning styles utilizing independent work and direct experience in learning. The better achievers also did not need as much specific information on assignments and also did not prefer to work with things. Data in this research study do indicate that students who enjoy learning independently tend to achieve better, which would be expected in classes taught by self-paced methods. (PN)

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THE RELATIONSHIP OF LEARNING STYLE, APTITUDE AND INSTRUCTIONAL PROGRAM VARIABLES TO ACHIEVEMENT IN THE MILITARY TRAINING ENVIRONMENT

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INTRODUCTION

In a study of the appropriateness of instructional strategies one of the most influential factors involved is the learning style of the students. Many authorities believe that how students learn is perhaps the single most important factor in their academic achievement. Students who are taught by methods incongruent with their learning styles face frustration and spend time adjusting to the instructional protocol.

Educators can no longer afford to assume that all students will learn through whatever strategy the teacher chooses to use. Learning styles, in particular, have dominated the interest of many educators (Canfield, 1980; Dunn, 1978; Gregorc, 1979; Hill, 1971; Kolk, 1981; Reckinger, 1979). Learning style is of special interest because individuals have preferred ways of analyzing and synthesizing all that they see, remember, and think about in specific educational settings (Messick & Associates, 1976). Consequently, individuals differ in style, rate, and overall quality of learning. The style of learning also influences teacher and pupil interaction and emphasizes the variety of ways in which individuals may differ from one another. Conceptually, people of varying ages and intellectual capacities learn differently. Therefore, selected methods of instruction are effective with some students while being ineffective with others (Dunn & Dunn, 1979; Emmer, 1974; Turner, 1979; Young, 1977).

This study was conducted to determine the learning style characteristic associated with achievement for beginning military personnel participating in a fundamental instructional program. Data will be useful in helping the

instructors to identify the characteristics of their students associated with higher achievement.

THE RESEARCH PROBLEM

The problem of this research study was to determine if there were significant relationships of aptitude and learning style variables to achievement by Navy and Marine Corps students in the Aviation Storekeeper Schools in common instructional interest areas.

The following questions were investigated:

1. When differences in aptitude and pre-achievement of the students are statistically controlled, will there be significant differences in achievement of Marine Corps (group-paced) and Navy (self-paced) students on common units of materials?
2. What combination of the following variables are best predictors of achievement among students trained at the Naval Technical Training Center, Meridian, Mississippi?
   a. Learning styles of students.
   b. Types of instructional programs.
   c. Aptitude for learning (ASVAB).

OVERVIEW OF RESEARCH DESIGN

A pretest-posttest comparison group research design was used in this study. Two groups of students, in the Navy and Marine Corps Aviation Storekeeper Schools, served as subjects for the Learning Styles Inventory prior to initiation of the study. Their aptitude for learning scores were provided from official records. In addition, the achievement tests used to assess learning were administered on a pretest basis.

The students were taught a series of lessons based on materials common to the curricula of both the Navy and Marine Corps Aviation Storekeeper Schools. At the end of the instruction the two groups were posttested in achievement, using the same achievement tests used in the pretest administration.

Following is an outline of tasks accomplished:

1. Navy and Marine Corps students were selected for participation.
2. Units were selected and achievement tests constructed.
3. Learning styles instruments and achievement tests were administered.
4. ASVAB scores were secured for all the students.
5. The units were taught.
6. The achievement tests were readministered.

MEASURING INSTRUMENTS

The following instruments were utilized in this research study: Learning Styles Inventory, The Armed Service Vocational Aptitude Battery (ASVAB), and three achievement tests developed by AK2 Crooks.

The Learning Styles Inventory was initially published in 1972, but has been continuously revised in content and format. It was developed by Albert Caufield and focuses on four major subscales: Conditions, Content, Mode and Expectation. The four subscales on the Learning Styles Inventory are described as follows: the subscale, conditions, measures motivational qualities. Approximately two-fifths of the items in the inventory are designed for this purpose. The items focus on four motivational areas. These areas are affil-

iation, eminence, structure, and achievement. The subscale, content, measures student comparative levels of interest. Six items in the inventory are designed for this purpose. The items focus on four major areas of interest. The areas are number or mathematical, qualitative or verbal, inanimate or manipulative, and people or inter-active. The subscale, mode, measures student preference for four different kinds of learning modes. These four learning modes are listening or auditory, reading, iconics, and direct experiences with subject matter. Within the expectation subscale, the collection of data from which an expectancy score is developed constitutes a major portion of the inventory. The score reflects the prediction of success or failure for the individual learner. The expectancy levels are divided into outstanding or superior level, above average or good level, average or satisfactory level, and below average or unsatisfactory level. The Learning Styles Inventory is presently being used in approximately 43 states and 3 foreign countries to measure some of the variables that affect learning. It is published in two forms designed for use with grades six through university post-graduate levels. Form S-A consists of 30 items and was used in this research study. Form S-B consists of only 25 items. Scale reliabilities ranged from .59 to .92 in the initial publication (Canfield, 1980).

The Armed Service Vocational Aptitude Battery (ASVAB) was first developed in the 1960s as a military aptitude test for high school students, and was shown to be advantageous in terms of recruitment of people. This led to the development of the expanded ASVAB in the late 1970s. The battery is administered to recruits as an aid in determining their eligibility to attend class "A" schools in the Navy. The component tests of the ASVAB used in this research

study are General Science (GS), Arithmetic Reasoning (AR), Word Knowledge (WK), Paragraph Comprehension (PC), Numerical Operations (NO), Coding Speed (CS), Auto and Shop Information (AS), Mathematical Knowledge (MK), Mechanical Comprehension (MC), Electronic Information (EI), Verbal Expression (VE).

The General Science (GS) test contains physical science and biological science items. Arithmetic Reasoning (AR) is a test covering reasoning problems involving arithmetic processes. Word Knowledge (WK) is a test of vocabulary. Paragraph Comprehension (PC) is a test to measure ability to understand what is read. The Numerical Operations (NO) test involves rapid performance of the four basic math operations using whole numbers. It is not intended as an arithmetic or mathematics test. Coding Speed (CS) is a test to see how quickly and accurately numbers in a table can be found. The Auto and Shop Information (AS) test measures an individual's knowledge of automobile parts and their functions, and contains questions about shop practices and the use of tools. The Mathematical Knowledge (MK) tests ability to solve general mathematical problems, including some elementary algebra and geometry. Mechanical Comprehension (MC) is a test covering mechanical principles such as use of levers, pulleys, gears and simple construction. The Electronics Information (EI) involves elementary knowledge of electrical, radio, and electronics information. Verbal Expression (VE) is computed by adding the raw score of Word Knowledge (WK) and Paragraph Comprehension (PC) converted to a standard score.

PROCEDURE FOR COLLECTION OF DATA

Permission to conduct this research study and to test the Navy and Marine Corps students at the Naval Technical Training Center, Meridian, Mississippi, was secured from Commander Barbara F. Beil, Commanding Officer, Naval Technical

Training Center, Meridian, Mississippi. Each student's Armed Service Vocational Aptitude Battery (ASVAB) scores were obtained with the identity of the students limited to Department of Defense personnel.

SELECTION AND SETTING OF SUBJECTS

The subjects for this research study were 16 Navy and 18 Marine Corps students undergoing training in the Aviation Storekeeper Schools at the Naval Technical Training Center, Meridian, Mississippi.

PURPOSE OF THE STUDY

The purpose of this research study was to determine how the Navy (self-paced) and the Marine Corps (group-paced) Aviation Storekeeper Schools students would perform on the same test, assessing mastery of an identical study topic related to the selected variables of learning styles and ASVAB test scores.

DATA ANALYSIS AND INTERPRETATION

Table I

Comparison of Marine and Navy Programs on Achievement

Program	N	Adjusted $\bar{X}$	F
Marine	18	34.94	
Navy	16	32.56	
			3.30

In reference to the first question, no significant differences (.05 level) were found between achievement by students in the group-paced Marine Corps Aviation Storekeeper School and the self-paced Navy Aviation Storekeeper School, as indicated on Table I. This finding indicates that the Marine Corps and Navy students learned equally well in the learning sequence studied.

Table II

Predicting Achievement by Use of Cognitive,

Aptitude and Learning Style Variables

Predictors	R	R^2	Simple r	F
Pretest	.1411	.0199	-.14	1.34
Specific information on assignment	.4473	.2001	-.43	4.21*
EI Electronic Information	.5446	.2966	.37	6.43*
MK Mathematical Knowledge	.6255	.3913	-.28	4.51*

In the regression analysis as illustrated by Table II, pretest scores accounted for only two percent of the variance. These data indicate that subjects knew very little information about the learning tasks(s) prior to instruction.

The learning style associated with student need for specific information on assignments correlated negatively (-.43 with their achievement). These data indicate that students did not need detailed written information concerning the structure of their assignments.

The ASVAB score related to electronic information was correlated positively (.37 with achievement for both groups). This explained approximately 10% of the variance in achievement. This possibly shows that those having more electronic information knowledge had a higher capacity for achievement. Additionally, the score related to mathematical knowledge correlated negatively (-.28 with achievement) indicating that those who had more background in mathematics did less well in achievement.

Table III

Simple Correlations of Learning

Styles with Achievement

Variables	r
Working with peers	.06
Clear organization/meaningful assignments	-.18
Setting one's own goals	.18
Competition	.08
Working with instructors	-.08
Specific information on assignment	-.43*
Working independently	.20*
Authority	.08
Working with numbers/logic	.10
Working with words/language	.08
Working with things	-.34*
Working with people	.18
Listening	-.06
Reading	-.09
Iconics	-.15
Direct experiences	.27*

*$r \geq .19$

Table III shows correlation coefficients relating each of the learning style variables to achievement. As noted on this table four of the learning style variables are correlated significantly with achievement. They are: 1) having specific information on assignment, 2) working independently, 3) working with things, and 4) the need for direct experiences in learning.

In summary, those who achieve better on the test preferred learning styles utilizing independent work and direct experience in learning. The better achievers also did not need as much specific information on assignments and also did not prefer to work with things.

More and more educational programs are employing the use of program materials for instruction in individually paced learning sequences. This mode of instruction, historically proved effective with students who were self-motivated and self-reliant. Further study is required to determine who can profit most from self-paced instruction.

Data in this research study do indicate that students who enjoy learning independently tend to achieve better, which would be expected in classes taught by self-paced methods. The expectation that setting one's own goals would be a positive contributor to achievement in self-paced instructional sequences was supported by statistics indicating that this learning strategy was nearly significant in predicting achievement (r=.18).

Data from this preliminary research study identified learning style factors which related to achievement. Larger sample sizes are required in order to develop a conceptual learning style model associated with self-paced and group-paced instruction.

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